

What is claimed is:

1. A method of processing a substrate, comprising:
depositing a low dielectric constant film comprising silicon and carbon on a substrate in the presence of RF power; and
post-treating the deposited low dielectric constant film by a process comprising:
heating the low dielectric constant film to a desired temperature of at least about 600°C at a rate of at least about 10°C/sec, wherein the low dielectric constant film is maintained at the desired temperature for about five seconds or less; and
then
cooling the low dielectric constant film at a rate of at least about 10°C/sec.
2. The method of claim 1, wherein the post-treating is performed under conditions sufficient to lower the dielectric constant of the low dielectric constant film.
3. The method of claim 1, wherein the low dielectric constant film is heated at a rate between about 10°C/sec and about 300°C/sec and cooled at a rate between about 10°C/sec and about 100°C/sec.
4. The method of claim 1, wherein the post-treating further comprises treating the low dielectric constant film with UV radiation.
5. The method of claim 4, wherein the process comprising heating and cooling the low dielectric constant film is performed simultaneously with the treating the low dielectric constant film with UV radiation.
6. The method of claim 5, wherein the post-treating further comprises treating the low dielectric constant film with an electron beam.

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7. The method of claim 6, wherein the low dielectric constant film is post-treated in an integrated processing system such that the low dielectric constant film is not exposed to atmosphere between the heating and the treating of the low dielectric constant film with an electron beam.

8. The method of claim 4, wherein the process comprising heating and cooling the low dielectric constant film and the treating the low dielectric constant film with UV radiation are performed sequentially.

9. The method of claim 1, wherein the post-treating further comprises treating the low dielectric constant film with an electron beam.

10. The method of claim 9, wherein the low dielectric constant film is post-treated in an integrated processing system such that the low dielectric constant film is not exposed to atmosphere between the heating and the treating the low dielectric constant film with an electron beam.

11. The method of claim 1, wherein the low dielectric constant film further comprises oxygen.

12. A method of processing a substrate, comprising:

depositing a low dielectric constant film comprising silicon and carbon on a substrate in the presence of RF power; and

post-treating the deposited low dielectric constant film by a process comprising:

heating the low dielectric constant film from a temperature of between about 25°C and about 250°C to a temperature of between about 600°C and about 1000°C, wherein the low dielectric constant film is heated at the temperature of between about 600°C and about 1000°C for about five seconds or less; and then

cooling the low dielectric constant film from a temperature of between about 600°C and about 1000°C, wherein the low dielectric constant film is heated and cooled within a time period of about 0.5 minutes to about 5 minutes.

13. The method of claim 12, wherein the low dielectric constant film is heated at a rate between about 10°C/sec and about 300°C/sec and cooled at a rate between about 10°C/sec and about 100°C/sec.

14. The method of claim 12, wherein the post-treating further comprises treating the low dielectric constant film with UV radiation.

15. The method of claim 12, wherein the post-treating further comprises treating the low dielectric constant film with an electron beam.

16. The method of claim 12, wherein the cooling the low dielectric constant film comprises exposing the substrate to backside gas.

17. A method of processing a substrate, comprising:
depositing a low dielectric constant film comprising silicon and carbon on a substrate in the presence of RF power; and
post-treating the deposited low dielectric constant film by a process comprising:

heating the low dielectric constant film to a desired temperature at a rate of at least about 10°C/sec, wherein the low dielectric constant film is maintained at the desired temperature for about five seconds or less; and then

cooling the low dielectric constant film at a rate of at least about 10°C/sec, wherein the low dielectric constant film is heated and cooled within a time period of about 0.5 minutes to about 5 minutes.

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18. The method of claim 17, wherein the low dielectric constant film is heated from a temperature of between about 25°C and about 250°C, and the desired temperature is between about 800°C and about 900°C
19. The method of claim 17, wherein the post-treating further comprises treating the low dielectric constant film with UV radiation.
20. The method of claim 17, wherein the post-treating further comprises treating the low dielectric constant film with an electron beam.